

ACCESSION #: 8904270009

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Peach Bottom Atomic Power Station - Unit 2 PAGE: 1 OF 7

DOCKET NUMBER: 05000277

TITLE: Inadequate Sealing of Emergency Core Cooling System Pump Rooms

Resulting In The Plant Being Outside The Design For Internal Flooding

EVENT DATE: 11/10/88 LER #: 88-009-01 REPORT DATE: 04/19/89

OTHER FACILITIES INVOLVED:DOCKET NUMBER: 05000

OPERATING MODE: N POWER LEVEL: 000

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION

50.73(a)(2)(ii)

LICENSEE CONTACT FOR THIS LER:

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COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:

REPORTABLE TO NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

In November 1988, several conditions were found that resulted in the plant being outside the design basis as described in the UFSAR for internal flood protection of the Emergency Core Cooling System compartments. Equipment penetrations through the walls were not sealed, and various spillways connecting the Compartments to the torus room were blocked. Conduits were inspected and did not appear sealed. The room drain piping had inadequately sealed inspection ports on the funnel covers and most floor cleanouts were open. These conditions would allow flooding between compartments. Also identified was that the drain piping in these rooms welded to closed funnels was not analyzed in that condition. These conditions were caused by original design, modification

control and procedural inadequacies. Existing procedures address compartment flooding and facilitate orderly Unit shutdown.

Sealing of the wall penetrations is essentially complete on Unit 2 and 46% complete on Unit 3. Two drain lines were determined to be unacceptable and were modified. The Unit 2 funnel inspection ports and floor cleanouts have been resealed. Procedural controls will be enhanced to verify and maintain proper drain line configuration. A seal inspection program will be implemented before the next refueling outage. Programmatic weaknesses have been corrected. There have been no previous similar LERs.

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Requirement for the Report

This LER is being submitted pursuant to 10CFR50.73(a)(2)(ii)(b) to report several related conditions that resulted in the plant being outside the design basis for internal flood protection.

Status of Units at the Time of Discovery

Unit 2 was in cold shutdown and Unit 3 was in the refuel mode with the core offloaded.

Description of Condition

On November 10, 1988, it was determined that several walls on Unit 2 and Unit 3 were not watertight as described in the Updated Final Safety analysis Report (UFSAR). The resulting investigation identified unsealed mechanical penetrations (EIIS:PEN) and electrical conduit (EIIS:CND), and blocked spillways. Other ongoing investigations identified unsealed drain funnels and unanalyzed drain piping. These conditions compromise or could compromise the watertight integrity of the Emergency Core Cooling System (ECCS) pump rooms. On May 12, 1988, an observation made during a routine housekeeping tour of

Unit 3 was reported, indicating that a ventilation duct which passed through the wall between the Reactor Building sump room and the Reactor Core Isolation Cooling (RCIC, EHS:BN) pump room was not sealed. On (or about) September 29, 1988, plant personnel investigating this observation, inspected the Similar wall in Unit 2, identified deficiency, and initiated a nonconformance report (NCR). The disposition to this NCR, dated October 18, 1988, provided instructions for restoring the seal and specified that non-fire barrier walls serving as internal flood barriers were to be inspected and the results documented on the NCR. The deficiency described in the NCR was determined to be non-reportable on November 10, 1988. The followup survey, required by the NCR, identified 9 other walls on Unit 2 and 11 walls on Unit 3 with unsealed penetrations below the torus room design flood level. These unsealed penetrations deviate from the design requirement as described in Appendix J of the UFSAR specifying that the walls of the ECCS Pump rooms will be watertight to one foot above the torus water level. Later on November 10, 1988, this was determined to be reportable condition.

On November 11, 1988, electrical conduit penetrating the watertight walls were opened at the access points, and it did not appear that they were sealed.

This condition may contribute to the compromised condition of the watertight walls.

On November 12, 1988, the inspection identified that the Unit 2 spillways, and 6 out of the 10 Unit 3 spillways, leading from the various ECCS pump rooms to the torus basement were partially or completely blocked. The blocked

spillways, conflict with Section 12.2.1 of the UFSAR, which specifies that each ECCS pump room is connected to the torus basement above its flood level to protect against flooding of more than one ECCS pump compartment due to a condensate pipe failure.

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On November 16, 1988, two other conditions were determined to potentially compromise the Watertight integrity of the ECCS pump rooms. During the Small Bore Pipe Assessment program it was identified that the piping welded to the Clean Radwaste (CRW) System (EIIS:WD) closed funnels was not analyzed as being welded to these funnels and may be overstressed during normal Operation. During a review of NRC I.E. Information Notice 83-44, "Potential Damage to Redundant Safety Equipment as a Result of Backflow Through the Equipment and Floor Drain Systems", an inspection of the CRW and the Dirty Radwaste (DRW) Systems (EIIS:WD) was also performed. This inspection identified that the as-built configuration of these systems conflicts with the design drawings. Specifically, it was noted that inspection ports, not a part of the original design, had been installed and were inadequately sealed. At a later date, followup inspection revealed that most of the floor cleanout plugs were missing and that screen mesh was substituted, effectively converting sealed portions of the systems into open floor drains (EIIS:DRN). These conditions would allow flooding between compartments required to be watertight. The delay in resolving the original housekeeping observation is the result of lower relative priorities placed on Unit 3 housekeeping issues at the time.

Subsequent followup resulted in the discovery of a similar condition on Unit 2.

Cause of the Conditions

The inadequate sealing of penetrations through the ECCS pump room walls has existed since plant construction. It is believed to have been caused by the lack of clear assignment of the penetrations to either the mechanical or civil disciplines of the Architect Engineer's organization. This condition was generally limited to floodwalls that are not firewalls because Modification 1110, which upgraded firewalls to conform with 10CFR50 Appendix R, verified that these walls were sealed. One fire damper was mounted one foot below the proper elevation due to an installation error.

To determine the cause for the blocked spillways, various documents ranging from startup records to the modification package for the Appendix R upgrade were reviewed. The review identified that the spillways on Unit 3 were blocked to comply with 10CFR50 Appendix R. Installation drawings of the Unit 3 fire seals show the spillways as open penetrations that were to be sealed.

The spillways are not shown on the Unit 2 fire seal installation drawings, therefore, the blocked spillways on Unit 2 were a pre-existing condition. No documentation was found identifying the spillways as a design feature to be deleted and no UFSAR change was initiated. It is therefore concluded that the spillways were blocked without an adequate cross-disciplinary review of the effects to the plant design basis.

The ECCS room equipment drains, routed to funnels, were shown on the isometric

drawings to be originally installed with free pipe ends discharging into open funnels, and were analyzed in that condition. In the late 70's, several drawings were revised to incorporate modifications. Included in these revisions were notes stating that the funnels were closed. Based on the limited information available, it is believed that the funnels were closed and the drain pipes were welded to the covers, without using the modification process, in response to I.E. Circular 78-06, "Potential Common Mode Flooding of ECCS Equipment Rooms at BWR Facilities" which

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preceded I. E. Information Notice 83-44. The impact of fixing the free end of the drain pipe was probably not considered because the work was performed on a non-safety related portion of the system. Had the alteration been performed under the modification process, appropriate engineering support would have been involved, which should have prevented the condition.

After the funnels were sealed, identification of valve leaks and clearing of obstructions were no longer possible. It is believed that this prompted the installation of inspection ports in the covers to facilitate the use of line cleaning equipment and telltale capability. Like the funnel covers, the inspection ports were also installed outside of the modification process.

Additionally, deficiencies in drain component configurations may have gone undetected due an inadequacy in the Startup procedure, which only required that the floor drain covers be verified in place. This inadequacy may have allowed the affected Unit to be restarted while the drain system was breached

at other access points (inspection ports or cleanout plugs). The inadequate modifications and startup procedure is attributed to the lack of general understanding of the drain systems and that its integrity is essential to ensure that multiple ECCS pumps would not be lost due to flooding in any one room.

Analysis of Condition

There were no actual adverse safety consequences resulting from these conditions. The plant has not experienced a High Energy Line Break (HELB) which could have resulted in the inoperability of equipment important to Safety. A flood in the Unit 3 High Pressure Coolant Injection (HPCI, EIIS:BJ) room occurred in 1981 while the unit was shutdown. The flood was caused by a blocking error which resulted in a valve opening and supplying water from the condensate storage tank (EIIS:TK) to a pump that was disassembled. Although the room filled with water to a height of twelve feet, leakage into other ECCS pump rooms was minor and did not threaten the equipment in those rooms. Due to the unsealed penetrations on watertight walls, ECCS room flooding under different circumstances could have resulted in cascade flooding to adjacent pump rooms. Although unlikely, the potential existed for common mode failures to the equipment located within the rooms bounded by the sealed (darkened) walls shown on the attached figure. For example, a flood in the RHR "A" pump room may flood the RHR "C" pump room. Although penetrations seals were never installed, flooding in any room would have filled that room several feet before Cascading to the adjacent room

because the unsealed penetrations were several feet above the floor. However, over the years, floor cleanouts on the CRW and DRW drain system were unplugged and erroneously converted to floor drains and closed drain funnels were opened. While these conditions could allow flooding to simultaneously spread into multiple compartments, the rate of level increase in the rooms would be slower than if the leak was contained in one room. Under these circumstances, the CRW and DRW sump pumps would be available to pump out the water. Their 300 gallon per minute (total) capacity could offset a leak of significant magnitude.

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The likelihood of flooding an ECCS pump room during plant operation is extremely remote. The significant flood sources described in the UFSAR (condensate storage tank and the torus suction piping) are low energy lines built to Seismic Class I criteria. The reliability of these lines is such that water accumulation is considered to be limited to flange gasket and valve packing leakage. If flooding conditions in a pump room did exist, annunciator alarms would alert the operators of excessive reactor building sump outflow, or of a water level in excess of six inches in any one or more ECCS pump room. Existing procedures address the identification of compartment flooding and provide direction to the operators facilitating an orderly Unit shutdown. The condition of blocked spillways was analyzed to assess the potential consequences resulting from postulated flooding, HELB, and tornado depressurization events. Since the condensate pipe located in the ECCS pump

rooms was upgraded to Seismic Class I in 1970, overflow protection of the ECCS rooms as described in the UFSAR was no longer required. Flooding due to a torus line failure would fill a room until the water level in the room and the torus were equal, and would not jeopardize the integrity of the walls.

Flooding from other causes could be isolated. The consequences from a HELB were analyzed considering other available vent paths. The results of this analysis indicate that sufficient vent paths were available to prevent the watertight compartment from being overpressurized. In conclusion, there were no potentially adverse consequences resulting from the blocked spillways.

During a reanalysis of the drain line installations, as discussed in the corrective actions section, it was determined that two Unit 2 RHR drain lines may incur stresses in excess of design. However, a NDE (non-destructive examination) performed on those lines did not reveal any failure indications. Further analysis of these two drain lines determined that they would have been able to perform their intended function under normal and accident conditions. It is, therefore, concluded that the inadequate drain lines would not have provided an additional flood path or initiated other events.

Corrective Actions

The sealing of the compartment Walls in Unit 2 started on November 13, 1988, and is essentially complete (1 unsealed penetration on each of two walls remain). Of the 156 penetrations identified, 68 of them were conduit. As a conservative approach, internal conduit seals were placed at the access points in cases where inspections did not verify a seal existed. This was performed

concurrently with the wall penetration sealing effort. The penetration containing the fire damper has been modified to retain potential flood water up to the proper elevation. On Unit 3, a detailed inspection of the walls and the sealing process began on January 26, 1989. To date, 128 penetrations were determined to require sealing; 67 of them were internal conduit.

Approximately 46% of the unsealed penetrations identified on Unit 3 have been sealed. To ensure that the penetration seals are maintained, an internal flood seal inspection program will be developed to monitor their integrity on a periodic basis. This program will be implemented prior to the next refueling outage on the respective unit.

The blocked spillways from the pump rooms into the torus basement were determined acceptable as is; therefore, they will be left blocked. The UFSAR and applicable

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plant drawings will be revised to reflect changes in plant design resulting from the blocked spillways.

Plugs have been installed in the floor cleanouts, drain funnel inspection ports and the floor drains on Unit 2. Drain system plugs will be installed on Unit 3 as appropriate prior to its restart. Administrative Procedure, A-42, "Control of Temporary Plant Alterations" (TPA) currently provides direction for configuration control of plant systems and lists the blocking or opening of floor drains as an example of a TPA. To ensure that the watertight integrity of the drain systems are controlled, signs will be placed

at drain system access points informing personnel that opening of the drain system requires shift management approval. In addition, the access plugs will be tagged and included on a routine test which will be performed following extended shutdowns part of GP-2, "Normal Plant Startup". The routine test will include a walkdown of the drain equipment required to be sealed. Procedural controls will be enhanced to ensure that changes to the drain system configuration are controlled. These actions are complete on Unit 2 and will be implemented on Unit 3 prior to its restart.

Sixty-three of the approximately 100 Un

t 2 drain lines that terminated in

drain funnels were chosen for evaluation. From these evaluations, it was concluded that the condition of potentially overstressed drain lines was limited to two lines on the Residual Heat Removal (RHR, EIIS:BO) system.

These lines were modified to reduce the calculated pipe stress within acceptable limits. Based on the results of the Unit 2 evaluation, four similar Unit 3 RHR lines were inspected and are being evaluated. Any Unit 3 conditions determined to be unacceptable will be corrected prior to its restart.

The procedural controls for modifications and temporary plant alterations have been strengthened considerably in the past few years. Additionally, assessments of the modification and the drawing control processes were performed as part of the Configuration Management Restart Readiness Program. Programmatic weaknesses in the modifications and temporary plant alteration

processes relating to configuration management were identified and have been corrected through procedural changes and training. The recently assembled Configuration Management Project will provide both continuing reviews of configuration management and recommendations for improvement, where appropriate.

Additional Information

There have been no previous LERs on inadequate protection of safety related equipment from internal flooding.

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FIGURE OMITTED - NOT KEYABLE (DRAWING)

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CCN-89-14058

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PEACH BOTTOM-THE POWER OF EXCELLENCE

D. M. Smith

Vice President

April 19, 1989

Docket No. 50-277

50-278

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U. S. Nuclear Regulatory Commission

Washington, DC 20555

SUBJECT: Licensee Event Report

Peach Bottom Atomic Power Station - Unit 2

This revised LER concerns the inadequate sealing of Emergency Core Cooling System pump rooms resulting in the plant being outside the design basis.

This revision provides new information regarding the cause and analysis of the event, and the corrective actions taken. Changes are indicated by a vertical bar in the page margins.

Reference: Docket No. 50-277 and 50-278

Report Number: 2-88-029

Revision Number: 01

Event Date: 11/10/88

Report Date: 04/19/89

Facility: Peach Bottom Atomic Power Station

RD 1, Box 208A, Delta, PA 17314

This LER is being submitted pursuant to the requirements of 10 CFR 50.73(a)(2)(ii)(b).

Very truly yours,

cc: T. P. Johnson, USNRC Senior Resident Inspector

W. T. Russell, USNRC, Region I

ATTACHMENT 1 TO 8904270009 PAGE 2 OF 2

bcc: ANI Library

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